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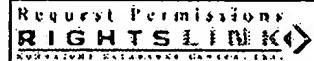
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Formation and properties of ternary silicide ($\text{Co}_x\text{Ni}_{1-x}\text{Si}$) thin films

Hong-Xiang Mo Xin-Ping Qu Jian-Hai Liu Guo-Ping Ru Bing-Zong Li

Dept. of Electron. Eng., Fudan Univ., Shanghai , China;

This paper appears in: Solid-State and Integrated Circuit Technology, 1998. Proceedings. 1998 5th International Conference on

Meeting Date: 10/21/1998 - 10/23/1998

Publication Date: 21-23 Oct. 1998

Location: Beijing China

On page(s): 271 - 274

Reference Cited: 6

Number of Pages: xxi+973

Inspec Accession Number: 6319144

Abstract:

A ternary silicide ($\text{Co}_x\text{Ni}_{1-x}\text{Si}_2$) formed by Ni and Co thin films or Ni, Co and Ti thin films deposited on a Si(100) substrate is studied. The results show that a highly conductive silicide ($\text{Co}_x\text{Ni}_{1-x}\text{Si}_2$) can be formed by solid phase reaction of either Ni/Co/Si or Co/Ni/Si structures. The resistivity of the silicide films is in the range of (15-20) $\mu\Omega\cdot\text{cm}$. The formation temperature of ($\text{Co}_x\text{Ni}_{1-x}\text{Si}_2$) is rather low compared the disilicides of Co and Ni. XRD data show that ($\text{Co}_x\text{Ni}_{1-x}\text{Si}_2$) has a CaF_2 structure its lattice constant is between that of CoSi_2 and NiSi_2 . ($\text{Co}_x\text{Ni}_{1-x}\text{Si}_2$) can also be form by rapid thermal annealing of a Co/Ni/Ti/Si multilayer structure. A quite low x_{\min} val shown by RBS/channeling investigation. The joint has a better epitaxy quality as compared with that without a Ti interlayer. It is more uniform and has a good thermal stability and low resistivity. Experiments with two step annealing and chemical select etching demonstrate that a self-aligned silicided contact and a gate-level interconnection structure can be formed on Si wafers

Index Terms:

Rutherford backscattering channeling cobalt compounds dielectric thin films electrical resistivity etching integrated circuit interconnections lattice constants nickel compounds rapid thermal annealing thermal stability 15 to 20 muohmcm $\text{CoNiSi}_2\text{-Si}$ RBS Si Si(100) substr XRD channeling chemical selective etching formation temperature gate-level interconnect structure lattice constant multilayer structure rapid thermal annealing resistivity self-aligned silicided contact solid phase reaction ternary silicide thermal stability thin films

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